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## Demographic, Criminal, and Psychiatric Factors Related to Inmate Suicide

ERIC BLAAUW, PhD, AD J.F.M. KERKHOF, PhD, AND LINDSAY M. HAYES, MS

A review of 19 studies suggests that it may be feasible to identify prisoners with suicide risk on the basis of demographic, psychiatric, and criminal characteristics. The present study aimed to identify combinations of characteristics that are capable of identifying potential suicide victims. Characteristics of 95 suicide victims in the Dutch prison system were compared with those of a random sample of 247 inmates in ten jails. Combinations of indicators for suicide risk were also tested for their capability of identifying 209 suicides in U.S. jails and 279 prison suicides in England and Wales. A combination of six characteristics (age 40+, homelessness, history of psychiatric care, history of drug abuse, one prior incarceration, violent offence) was capable of correctly classifying 82% of the Dutch suicide victims (82% specificity). Less powerful combinations correctly classified 53% of the U.S. suicides and 47% of the U.K. suicides. It is concluded that a set of demographic and criminal characteristics and indicators of psychiatric problems is useful for the identification of suicide risk in jails and prisons.

Many countries have penal systems where the suicide rate is several times higher than the community (e.g., Backett, 1987; Hayes, 1989; Kerkhof & Bernasco, 1990; Liebling, 1992). Within these systems, suicide rates are lower in facilities that generally detain inmates serving fairly long sentences (hereafter referred to as *prisons*) than in facilities that detain inmates serving short sentences and inmates who await trial, appeal, or transfer to

prison (hereafter referred to as *jails*) (e.g., Backett, 1987; Kerkhof & Bernasco, 1990; Laishes, 1997). These high rates of inmate suicide are most likely due to the exposure of vulnerable people to a stressful situation (Blaauw, Kerkhof, & Vermunt, 1997; Liebling, 1992). Certainly, imprisonment is stressful, especially during the initial stages of confinement (Blaauw et al., 1997). In addition, characteristics that are associated with suicide risk in the free world (Clark & Fawcett, 1992) are highly prevalent among inmates: many are male, unemployed, and socially isolated (Gunn, Robertson, Dell, & Way, 1978) and disproportionate numbers, especially in jails, suffer from psychological distress (e.g. Blaauw et al., 1997; Gunn et al., 1978), psychiatric disorders (Blaauw, Roesch, & Kerkhof, 2000; Harding & Zimmerman, 1989), and physiological disturbances associated with withdrawal from substances (Gibbs, 1987; Walker, 1983).

Many studies on suicides in penal institutions have shown that the majority of

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suicide victims possess characteristics that are indicative of vulnerability for suicide in the community. Nineteen studies (see Table 1) with relatively few methodological shortcomings have shown with great consistency that many suicide victims are male (weighed average: 96%); unemployed (16% in U.S. jails and 44% in other countries); single (51%) or separated/divorced/widowed (17%); and have histories of suicide attempts (47%), prior incarcerations (72%), alcohol abuse (40%), psychiatric illnesses (44%), and drug abuse (54% in U.S. jails and 33% in other countries). The consistency over studies suggests that suicide victims in different systems (jail or prison) and countries share more similarities than differences and that it may be possible to screen for suicide risk. Conversely, variations in the victims' unemployment, history of drug abuse, and violent offenses as the reason for their incarceration (30% in U.S. jails, 60% in U.S. prisons, 45% in other countries); the sharing of characteristics by suicide victims and the general inmate population; and a further growth in the number of psychiatrically disordered and otherwise problematic inmates (Gunn, 2000) suggest that it is difficult to screen for suicide risk.

The present article investigates whether vulnerability for suicide can be recognized from characteristics that can be measured without difficulty at the time of entry into the criminal justice system: inmates' demographic and criminal characteristics and unequivocal indicators of psychiatric problems. There is a need for a screening instrument that is specially designed for prison systems because it is well-known that suicide predictors are "variously weighted; they mix and meld (co-morbidity) in different complex 'suicidal careers' or conditions over time" (Maris, 1992, p. 10). As such, general suicide screening instruments are unlikely to be very useful in a population that is characterized by suicide vulnerability and in a situation in which even mentally strong and healthy individuals may feel tested to the limits of their coping resources. In addition, there is a need for uncomplicated indicators of suicide risk because prison systems usually have insufficient numbers of psychiatrists and

psychologists for an adequate screening of suicide risk (Blaauw et al., 2000). The available suicide screening devices for prison systems, such as the Suicide Checklist (see Arboleda-Florez & Holley, 1988) and the New York Suicide Prevention Screening Guidelines (see Sherman & Morschauser, 1989), meet these demands as they were specifically designed for prison systems and can be administered by nurses or correctional officers. These instruments, however, were not designed on the basis of empirical research, and information about the sensitivity and specificity of the instruments for the prediction of suicides is hardly available (but see Arboleda-Florez & Holley, 1989; Cox & Morschauser, 1997).

### INDICATORS OF SUICIDE RISK

Comparisons of demographic and criminal characteristics of suicide victims with information obtained from prison statistics have yielded equivocal findings. Some studies found an overrepresentation of male (Schimmel, Sullivan, & Mrad, 1989; White & Schimmel, 1994), white (Anno, 1985; Hayes & Kajdan, 1981; Hayes & Rowan, 1988; Marcus & Alcabes, 1993; Salive, Smith, & Brewer, 1989), unemployed (Hatty & Walker, 1986), and single or unmarried inmates (Anno, 1985; Hatty & Walker, 1986) among suicide victims and a relationship with age (Dooley, 1990; Hatty & Walker, 1986; Kerkhof & Bernasco, 1990; Liebling, 1992). Conversely, other studies found no relationship with age (Anno, 1985; Denoon, 1983; Dooley, 1990; Laishes, 1997; Hatty & Walker, 1986; Hayes & Kajdan, 1981; Hayes & Rowan, 1988; White & Schimmel, 1994) and no overrepresentation of males (Anno, 1985; Denoon, 1983; Dooley, 1990; Hardyman, 1983; Hayes & Kajdan, 1981; Hayes & Rowan, 1988; Laishes, 1997), white (Denoon, 1983; Dooley, 1990; Hardyman, 1983; Hatty & Walker, 1986; Laishes, 1997; Schimmel et al., 1989; White & Schimmel, 1994), unemployed (Kerkhof & Bernasco, 1990), and single or unmarried inmates (Denoon, 1983; Hayes &

**TABLE 1***Characteristics of Studies on Suicide and Identified Risk Factors in Jails and Prisons*

Author	Sample	Comparison group	Identified risk factors on the basis of comparisons	Suggested risk factors not on the basis of comparisons
<b>U.S. jails</b>				
Copeland	23 suicides in jails in Metropolitan Dade County, '56-'82			
Durand et al.	37 suicides in Detroit's Wayne County jail, '67-'92	Jail admission statistics	Offence (murder/manslaughter)	
Hardyman	46 suicides in jails in Ohio state, '80-'81	Ohio arrest statistics		Crime (alcohol/drug-related)
Harris	103 suicides in Los Angeles County jails, '77-'87			Crime (alcohol/drug-related or violent)
Hayes & Kajdan	344 suicides in U.S. jails, 1979	Bureau of Justice statistics	Race (White), offence (alcohol/drug-related)	
Hayes & Rowan	237 suicides in U.S. jails, 1986	Bureau of Justice statistics	Race (White)	Prior arrests
Marcus & Alcabes	48 suicides in a New York City jail, '80-'88	Data from a '88 prevalence study of health	Race (White), history of alcohol abuse	Prior incarcerations, offence (against person), history of drug abuse, history of mental illness, prior suicide attempts
Stone	107 suicides in jails in Texas, '86-'88			
<b>U.S. prisons</b>				
Anno	38 suicides in prisons of the Texas Department of Corrections, '80-'85	Texas DOC statistics	Race (White), marital status (single, separated/divorced/widowed), prior incarcerations, offence (crime against person)	History of mental illness, prior suicide attempts
Salive et al.	37 suicides in Maryland State prisons, '79-'87	Maryland State prison statistics '83	Age (25-34), race (White), offence (crime against person)	
Schimmel et al.	43 suicides in American federal prisons, 1989	Federal Bureau of prisons statistics	Gender (male)	
White & Schimmel	43 suicides in American federal prisons, 1994	Federal Bureau of prisons statistics	Gender (male)	

*(continued)*

**TABLE 1**  
*Continued*

Author	Sample	Comparison group	Identified risk factors on the basis of comparisons	Suggested risk factors not on the basis of comparisons
<b>Other countries</b>				
Green et al.	133 suicides in Canadian federal penitentiaries, '77–'88			Marital status (single, separated/divorced/widowed), prior incarcerations, history of alcohol or drug abuse, history of psychiatric treatment, prior suicide attempts
Laishes	66 suicides in the Correctional Service of Canada, '92–'96	CSC statistics	Offence (murder)	
Backett	33 suicides in Scottish prison system, '70–'82			Prior incarcerations
Kerkhof & Bernasco	44 suicides in Dutch prison system, '73–'84	Registered data of 54 inmates	Age (older), race (non-White), offence (murder/manslaughter)	
Dooley	295 suicides in prison system of England & Wales, '72–'87	England & Wales prison statistics	Age (older), offence (crime against person)	History of psychiatric treatment, prior incarcerations
Hatty & Walker	77 suicides in Australia's Corrective Services Departments, '80–'85	Australia's CSD prison statistics	Age (20–29 or over 50), marital status (non-married), not-unemployed, offence (murder), no prior incarcerations	Prior suicide attempts
Denoon	35 suicides in jails and prisons in British Columbia, Canada, '70–'80	British Columbia prison statistics	Offence (violent offence, especially murder), history of psychiatric treatment	Prior suicide attempts

*Note.* Hayes and Rowan's study originally included 339 suicides but 102 suicides occurred in police facilities and were therefore excluded from the analyses.

Kajdan, 1981; Hayes & Rowan, 1988; Laishes, 1997). Many studies found prior incarcerations (Anno, 1985; Backett, 1987; Dooley, 1990; Green et al., 1993; Hayes & Kajdan, 1981; Hayes & Rowan, 1988; Marcus & Alcabes, 1993) and current charges of violent crimes (Anno, 1985; Denoon, 1983; Dooley, 1990; Durand et al., 1995; Harris, 1987; Hatty & Walker, 1986; Kerkhof & Bernasco, 1990; Laishes, 1997; Marcus & Alcabes, 1993; Salive et al., 1989) to be more common among suicide victims than among general inmates. Far fewer studies found an absence of prior incarcerations (Hatty & Walker, 1986) and current charges of alcohol or drug-related offenses (Hardyman, 1983; Hayes & Kajdan, 1981; Hayes & Rowan, 1988) to be more common among suicide victims. These findings suggest that demographic characteristics may be less useful for screening of suicide risk than criminal characteristics, and that the usefulness of criminal characteristics may vary.

Several authors suggested that inmate suicides are associated with histories of suicide attempts (Anno, 1985; Denoon, 1983; Green et al., 1993; Marcus & Alcabes, 1993), psychiatric illness (Anno, 1985; Denoon, 1983; Dooley, 1990; Green et al., 1993; Marcus & Alcabes, 1993), drug abuse (Green et al., 1993; Marcus & Alcabes, 1993), and alcohol abuse (Green et al., 1993; Marcus & Alcabes, 1993). A lack of opposition indicates that psychiatric characteristics may be useful for the prediction of vulnerability for suicide in penal institutions; however, many studies had small samples and, with only one exception (Kerkhof & Bernasco, 1990), did not employ a comparison group or relied on prison statistics, which seldom allow for comparisons of psychiatric characteristics. Thus, there is no solid evidence for associations between psychiatric characteristics and suicide. Moreover, due to the absence of comparison groups it is unknown whether combinations of demographic, psychiatric, and criminal characteristics can be used for the recognition of suicide vulnerability in penal institutions. The present study tested such combinations for their capability of distinguishing suicide

victims from general inmates in The Netherlands and whether such combinations were also common among suicides in systems in England and Wales, and the United States.

## METHOD

### *Samples*

In the period 1987–1998, the Dutch prison system had grown to 39 penal institutions for adult inmates and ten institutions for the treatment of mentally disordered offenders. The average daily population had grown to 13,400 adult inmates (900 receiving treatment, 4,500 sentenced, and 8,000 other inmates). Of the 95 suicides, 73% occurred in jails, 14% in treatment institutions, and 14% in prisons. These percentages are, respectively, higher, higher, and lower than the corresponding percentages in the entire prison system population over the same time period,  $z_s(n = 95) > 1.6$ ,  $ps < .05$ .

Inspection of the Dutch prison statistics over 1987–1998 showed that the comparison group did not differ from the general inmate population with regard to gender, age distribution, and nationality. As can be expected when sampling in a jail population, inmates from the comparison group were relatively less often charged with violent offenses, 24% *vs.* 33%;  $z(n = 247) = 2.9$ ,  $p < .005$ , and more often with substance-related offenses, 27% *vs.* 17%;  $z(n = 247) = 4.3$ ,  $p < .05$ .

### *Measurements*

Information was gathered regarding gender; age; country of birth; race; marital status; living situation; employment; most serious offense; prior incarcerations; prior suicide attempts; history of psychiatric care; and lifetime history of alcohol, soft drugs, and hard drugs abuse. Participants' responses were checked with reports. Histories of alcohol or soft drug abuse were considered present when the person had consumed large quantities of alcohol or soft drugs (e.g., cannabis) at least three times a week for at least

1 year. A history of hard drug abuse was considered present when the person had used hard drugs (e.g., cocaine, opiates) at least once a week for at least one year. A history of psychiatric care was considered present when the person had received (inpatient or outpatient) care for a mental disorder excluding alcohol/drug abuse or dependence. Offenses were categorized into three categories: violent offenses (slave trade, kidnapping, murder, manslaughter, abortion, aggravated assault); alcohol or drug offenses (possession, trafficking, driving while intoxicated); and other offenses.

#### *Procedure*

Approval for the study was obtained from the medical ethical committee at the Vrije Universiteit Amsterdam and the Dutch Ministry of Justice. At all institutions and organizations working with the Dutch prison system (e.g., National Department of Criminal Investigation, Laboratory of Forensic Pathology, Regional Forensic Psychiatric Services), registration systems were examined and representatives were interviewed in order to find occurrences of deaths and information about the deceased and the circumstances of their deaths. Subsequently, institutional documentation systems were examined and jail officials (psychologists, psychiatrists, medical doctors, nurses, correctional officers) were interviewed in all penal institutions where a death had occurred. A checklist containing pre-structured questions was used for the interviews and examinations of the death investigation and autopsy reports, medical files, psychological evaluation reports, and criminal history reports. Deaths were included in the study when inmates (1) died between January 1987 and February 1998, (2) were administratively (not necessarily physically) present in a penal institution, (3) and the first two authors of this article concurred with the National Department of Criminal Investigation, coroner, or prison staff that the death was self-inflicted. A total of 100 deaths met these criteria. In order to remove some of the unreliable data (different sources yielding too

limited or inconsistent information about the variables of interest), five suicides were excluded from the study. The final sample consisted of 95 suicides, representing 95 percent of all suicides in the Dutch prison system during 1987–1998.

A comparison group was formed from inmates in ten Dutch jails for adults. The aim was to identify suicide vulnerability at the earliest possible stage of confinement, which made the jail population the target population because jails are the first link in the chain of penal institutions. Of 291 inmates who were randomly selected from occupancy-lists (by use of a list with random numbers names were depicted), 247 inmates agreed to participate (85% response; 15% of inmate population in the ten jails). After signing an informed consent, in which confidentiality and anonymity were assured, inmates were interviewed by trained clinical psychology students in a one to one situation. In 53 cases, the interviews were held in English, German, French, or Turkish (38) or another language with help from an interpreter (15). Information on the respondents' offense was gathered from institutional files. Information on respondents' psychiatric illnesses was gathered from medical files and interviews with the prison psychologists. All other information was obtained through interviews.

Two large data-sets from other countries were obtained. Hayes (1989) supplied the survey questionnaires of 339 suicides that had occurred in holding and detention facilities in the United States in 1986. In the present study, only data for 209 jail suicides were used. Dooley (1990) supplied the original coding sheets from all 295 suicides in prisons (including remand and youth custody centers) in England and Wales during 1972–1987. In the present study, only data for 279 adult suicides were used.

#### *Statistical Analyses*

Characteristics of the suicide victims and the comparison group were compared through use of  $\chi^2$  tests and a Mann-Whitney

*U* test. Cases with missing data were omitted from these analyses.

Combinations of characteristics were analyzed in order to construct a model for the recognition of suicide victims in the Dutch prison system. The characteristic of interest was dichotomous (suicide group or comparison group), which made stepwise logistic regression analysis the choice for the construction of the model. Dichotomous demographic and criminal characteristics and indicators of psychiatric problems that differentiated between suicide victims and the comparison group were used as categorical predictor variables in this analysis. Predictor variables were allowed to enter the model when they had a significant (at  $p < .05$ ) contribution to the prediction.

It was also tested whether combinations of characteristics were capable of identifying suicides in penal institutions in the United States and England and Wales. Logistic regression analyses (method stepwise) were performed on all characteristics that were shared by the Dutch study and the U.S. study (age, marital status, offense, prior arrests) or UK study (age, living situation, offense, prior incarcerations, history of psychiatric contact, records of self-injury). All variables were re-coded into two categories (characteristic present versus characteristic absent or unknown). In the first logistic regression analysis for each country, which variables were associated with the two different Dutch samples (comparison group, suicide victims) were tested. With the coefficients (*B*) obtained from this analysis, it was then tested how many suicide victims from the non-Dutch data-set were correctly classified by the model. In the second logistic regression analysis for each country, it was tested which variables were associated with the Dutch comparison sample and the country's suicide sample. In both analyses, the cut-off level was set at a specificity of approximately 82 percent because an inquiry learned that approximately 18 percent of newly arrived inmates in the Netherlands are seen by a psychologist, indicating the possibility to assess 18 percent for the presence of suicide risk.

## RESULTS

### *Associations of Single Characteristics and Suicide*

With regard to demographic characteristics, Table 2 shows that the suicide victims and the comparison group had different distributions of age, marital status, and living situation. Suicide victims were more often over 40, separated, divorced or widowed, and of no fixed abode, and less often living in a home with other people. The two samples did not differ with regard to gender, country of birth, race, and employment.

Table 2 also shows that criminal characteristics were significantly different between the suicides and the comparison group. Suicide victims more often had a history of only one prior incarceration in a jail or prison and they were more often charged with (or convicted for) violent offenses and less often with alcohol or drug offenses or other offenses.

Further, several indicators of psychiatric problems had different distributions in the two samples (see Table 2). Suicide victims more often had histories of hard drug abuse, multiple substance abuse, psychiatric care, and suicide attempts. The two samples did not have different histories of alcohol abuse or soft drug abuse. Of 70 suicide victims (25 missing cases), 73% had received a psychiatric diagnosis (excluding alcohol or drug dependence) by a psychiatrist during their imprisonment, most often a psychotic disorder (44%), personality disorder (43%), or affective disorder (21%). Of the respondents of the comparison group, 12% had received a psychiatric diagnosis but information about psychiatric disorders was present for only 27%. Information about the psychiatric diagnoses was omitted in the further analyses.

### *Combinations of Characteristics*

Stepwise logistic regression analysis on all 281 Dutch cases without missing values (48 suicides and 233 controls) showed that a very good prediction of suicide vulnerability,



**TABLE 2***Characteristics of Suicide Victims and Detainees Generally in The Netherlands (%)*

Characteristic ( $n_{\text{suicide}}$ , $n_{\text{comparison group}}$ )	Suicide victims	Comparison group	Difference
<b>Demographic characteristics</b>			
Male (95, 247)	94	92	$\chi^2(1) = .3$ , <i>ns</i>
Age categories (95, 232)			$U = 8939$ , $p = .025$
20–29	43	40	
30–39	29	40	
40+	28	14**	
Marital status (90, 177)			$\chi^2(2) = 4.1$ , <i>ns</i>
married, living together	19	22	
single	65	70	
separated, divorced, widowed	16	8*	
Living situation (75, 247)			$\chi^2(2) = 41.6$ , $p = .000$
alone	31	28	
together	45	70***	
no fixed abode	24	2***	
Born in the Netherlands (95, 247)	61	51	$\chi^2(1) = 2.6$ , <i>ns</i>
White (95, 247)	79	77	$\chi^2(1) = .2$ , <i>ns</i>
Employed (75, 247)	28	35	$\chi^2(1) = 1.5$ , <i>ns</i>
<b>Indicators of psychiatric problems</b>			
History of alcohol abuse (80, 236)	30	28	$\chi^2(1) = .1$ , <i>ns</i>
History of hard drug abuse (78, 234)	58	29	$\chi^2(1) = 22.2$ , $p = .000$
History of soft drug abuse (74, 234)	43	35	$\chi^2(1) = 1.8$ , <i>ns</i>
Type of substance abuse (74, 234)			$\chi^2(2) = 9.0$ , $p = .004$
none	31	45*	
single	25	30	
multiple	44	26**	
Prior suicide attempts (87, 245)	54	29	$\chi^2(1) = 18.0$ , $p = .000$
History of psychiatric care (71, 244)	78	18	$\chi^2(1) = 91.1$ , $p = .000$
<b>Criminal characteristics</b>			
Prior incarcerations (95, 244)			$\chi^2(2) = 7.5$ , $p = .03$
none	30	41	
one	26	15*	
more than one	44	44	
Type of offence (93, 247)			$\chi^2(2) = 22.6$ , $p = .000$
violence	50	24***	
alcohol or drug	15	27*	
other	36	49*	

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

$\chi^2(6, N = 281) = 102.07$ ,  $p < .0001$ ,  $R^2 = .52$ , was formed by a model that successively included history of psychiatric care, age over 40, violent offence, homelessness, one prior incarceration, and history of hard drug abuse (see Table 3). Inclusion of marital status, history of multiple substance abuse, living situa-

tion, and prior suicide attempts did not further improve the model. With each indicator assigned the beta weight and with a specificity of 82% (cut-off at 2.73; higher scores indicate a suicide victim), the model correctly classified 82% of the suicides (82% in jails and 81% in prisons and treatment institutions).

**TABLE 3**  
*Logistic Regression Analysis Predicting Vulnerability to Suicide in Dutch Samples*  
*(comparison group, suicides)*

Characteristic	<i>B</i>	Wald	Odds ratio (95% C.I.)
All variables			
History of psychiatric care	2.40	28.75***	10.98 (4.59–26.40)
Age over 40	1.68	11.34**	5.35 (2.02–14.20)
Violent offence	1.35	10.17**	3.85 (1.68– 8.82)
Homelessness	2.14	9.09**	8.54 (2.13–34.55)
One prior incarceration	1.38	7.33**	3.99 (1.47–10.87)
History of hard drug abuse	1.03	5.25*	2.79 (1.16– 6.69)
Variables shared by Dutch and U.S. study			
Violent offence	1.08	17.35***	2.96 (1.78– 4.92)
Age over 40	1.02	10.51**	2.76 (1.49– 5.10)
Prior incarcerations	.73	6.76**	2.08 (1.20– 3.60)
Variables shared by Dutch and British study			
History of psychiatric care	2.13	49.43***	8.41 (4.64–15.22)
Homelessness	2.32	17.68***	10.14 (3.44–29.85)
Age over 40	1.08	9.33**	2.95 (1.47– 5.90)
Violent offence	.79	6.68**	2.20 (1.21– 3.99)
Prior incarcerations	.73	4.96*	2.08 (1.09– 3.97)

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

#### *Other Countries*

Stepwise logistic regression analysis on four variables that were shared by the Dutch and U.S. datasets revealed that a moderately good prediction of suicide vulnerability in the Dutch samples,  $\chi^2(3, N = 342) = 33.38$ ,  $p < .0001$ ,  $R^2 = .13$ , was formed by three predictor variables: violent offence, age over 40, and prior incarcerations (see Table 3). With each indicator assigned the beta weight, the model correctly classified 40% of the 95 Dutch suicides and 37% of the 209 U.S. suicides (42% pre-trial and 30% sentenced) at a specificity of .83 in the Dutch comparison group (cut-off at 1.75). Stepwise logistic regression analysis on the Dutch comparison sample and the U.S. suicide sample revealed a moderately good prediction of suicide vulnerability,  $\chi^2(1, N = 456) = 41.80$ ,  $p < .0001$ ,  $R^2 = .12$ , by only one predictor variable: violent offence (see Table 4). With the predictor, 76% of the Dutch comparison group and 53% of the 209 American suicides (56% pre-

trial and 49% sentenced) were correctly classified.

Stepwise logistic regression analysis on six variables that were shared by the Dutch and UK datasets revealed that a good prediction of suicide vulnerability in the Dutch samples,  $\chi^2(5, N = 342) = 112.96$ ,  $p < .0001$ ,  $R^2 = .41$ , was formed by a model that successively included history of psychiatric care, homelessness, age over 40, violent offence, and prior incarcerations (see Table 3). The model correctly classified 74% of the 95 Dutch suicides and 38% of the 279 UK suicides (39% on remand and 38% sentenced) at a specificity of .83 in the Dutch comparison group (cut-off at 2.13). Stepwise logistic regression on the Dutch comparison group and the UK suicide group revealed a fairly good prediction of suicide vulnerability,  $\chi^2(6, N = 526) = 80.56$ ,  $p < .0001$ ,  $R^2 = .19$ , by a model that successively included violent offence, prior incarcerations, homelessness, prior suicide attempts, age over 40, and history of psychiatric care (see Table 4). With a speci-

**TABLE 4**

*Logistic Regression Analyses Predicting Vulnerability to Suicide  
(Dutch comparison group, U.S./British suicides)*

Characteristic	B	Wald	Odds ratio (95% C.I.)
United States			
Violent offence	1.28	39.70***	3.61 (2.42– 5.38)
England and Wales			
Violent offence	1.12	31.47***	3.08 (2.08– 4.56)
Prior incarcerations	.69	11.72***	2.00 (1.34– 2.97)
Homelessness	1.48	9.56**	4.40 (1.72–11.24)
Prior suicide attempts	.46	4.81*	1.58 (1.05– 2.37)
Age over 40	.50	3.91*	1.65 (1.00– 2.71)
History of psychiatric care	.47	3.86*	1.59 (1.00– 2.54)

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

ficity of .81 in the Dutch comparison group, the model correctly classified 47% of the 279 UK suicides (48% on remand and 47% sentenced).

## DISCUSSION

As with other studies, the present study shows that many demographic and criminal characteristics differentiate between suicide victims and inmates generally. What is new is that the present study demonstrates that several indicators of psychiatric problems differentiate between suicide victims and inmates generally. Moreover, a combination of two demographic characteristics (age over 40, homelessness), two criminal characteristics (one prior incarceration, violent offence), and two indicators of psychiatric problems (history of psychiatric care, history of hard drug abuse) proved capable of identifying 82 percent of the suicide victims in the Netherlands at a specificity of .82 in the general inmate population. Thus, all three types of characteristics are associated with suicide risk. Moreover, the finding indicates that the six indicators of suicide risk may be useful for the identification of inmates who need to be subjected to further assessment of suicide risk.

It was not possible to fully investigate the value of the six characteristics for the

identification of suicide victims in other countries' penal systems because other studies did not address all indicators, provided unreliable data about these indicators, or did not employ comparison groups of nonsuicidal prisoners. Less powerful models based on the Dutch samples were capable of correctly classifying 37 percent of the American suicides and 38 percent of the UK suicides. These percentages are high, but more pronounced when one realizes that the less powerful combinations of characteristics had lower sensitivities in the Dutch sample (respectively, .40 and .74). Moreover, additional analyses on the American and UK suicide samples showed that small sets of demographic, psychiatric, and criminal characteristics correctly classified 53 and 47 percent of the suicides in these two samples. Thus, it can be concluded that a small set of demographic, psychiatric, and criminal characteristics has great value for the identification of suicide risk.

The models correctly classified about equal numbers of sentenced suicide victims and remand suicide victims in the three countries. These findings underline the notion that suicides in remand centers and prisons share more similarities than differences; however, the sensitivities were found to differ between countries, and different models were generated in different countries, which is somewhat contradictory with the notion that

suicides in different countries share more similarities than differences. Thus, there is a need for further research on vulnerability for suicide.

Psychiatric diagnoses were not included in the comparative analyses, which may seem an important omission because psychiatric disorders are indicative of heightened suicide risk (73% of the Dutch suicide victims were diagnosed with a psychiatric disorder). Yet many variables provide an indication of the existence of a psychiatric disorder (e.g., histories of psychiatric care, substance abuse, and suicide attempts) and the aim of the present study was to identify characteristics that can be measured without difficulty at admission in the penal system. Arguably, psychiatric disorders are not easily identifiable at the time of arrival in a jail and are even often missed during the incarceration (Blaauw et al., 2000).

Some shortcomings call for further research. First, the statistical analysis had only a moderately strong statistical power because they were based on a limited number of suicides (48 in the main analysis). Second, 18 percent of the suicide victims were not correctly classified and 18 percent of the comparison group were classified as suicidal, which calls for research to further increase the sensitivity and specificity of suicide prediction.

Third, the characteristics are doubtlessly less useful in more homogeneous samples that are selected on the basis of some of the characteristics, such as institutions for mentally disordered offenders, divisions for suicidal inmates, and divisions for violent offenders. In such samples it will not be possible to distinguish potential suicide victims from general inmates with the use of the characteristic on the basis of which they were put together in the same division. In addition, the characteristics are likely to have different weightings in samples that were not part of the present study, such as samples of juveniles, police custody detainees, and offenders on probation. Such samples are likely to have different distributions of the characteristics and they are faced with a different

situation. This calls for further research in such institutions, divisions, and samples.

Fourth, the models were based on suicides that sometimes occurred as far back as 1972 and on comparisons with inmates who were incarcerated in 1998. The early suicides may have had some different characteristics to more recent suicides—but additional analyses did not reveal such differences—and the choice of a recent comparison group may have lowered the model's sensitivity because current inmate populations are more problematic than earlier populations. Fifth, several suicides had missing values on the variables of interest. These missing values were treated as if risk indicators were absent, which undoubtedly has led to lower sensitivities.

Sixth, as previously stated, it was not possible to fully investigate the value of the six characteristics for the identification of suicide victims in other countries' penal systems. International studies employing suicide and comparison samples could address this issue. Finally, the present study does not provide much information about the causes of suicide in prison systems. The findings that suicide victims were relatively often over the age of 40, homeless, and known with histories of psychiatric care and hard drug abuse indicate that either vulnerability or a sense of isolation is the key factor in inmate suicides. In addition, these findings do not explain why not all these people succumbed to the most stressful early stages of confinement. Furthermore, the finding that suicide victims were relatively often charged with (or convicted for) violent offences may be explained by the idea that they were accordingly more often serving longer prison sentences, with less changes for parole and rehabilitation, which may have caused them to feel more hopeless and depressed. The finding may also be explained by the notion that violence and suicide represent the expression of the same underlying aggressive impulse and that other factors determine whether the aggression is directed toward others or toward oneself (Plutchik, 1995). The finding may even be explained by the finding that violent offenders relatively often become the victim of bul-

lying (Blaauw, Winkel, & Kerkhof, 2001), which may make incarceration even more stressful for such offenders.

None of the shortcomings undermine the conclusion that a small set of characteristics may have great value for the identification of suicide risk in prisons. The characteristics are easy to identify, unambiguous, require no special knowledge from the assessor, can be inventoried within a few minutes, and are insensitive for situational influences. The characteristics can easily be incorporated in a screening device which can be administered during the intake process for new inmates. One should then count the number of characteristics present, assign corresponding weights to the those present (e.g., 1.68 points when the inmate is over the age of 40; 2.14 points when the inmate is homeless), and check whether the total score exceeds the cut-off (e.g., 2.73). Scores above the cut-off (e.g., 2.73) would then indicate that suicide risk could be present. Because approximately 18

percent of all entering inmates will have high scores, high scorers should not automatically be considered suicidal but should be referred to a mental health professional for further assessment of suicide risk. Clearly, assessing 18 percent of all inmates for the presence of suicide risk constitutes a workload for the mental health professionals but such a procedure may identify the vast majority of inmates with heightened suicide risk. Further validation research in other countries and in more homogeneous and heterogeneous samples is needed however. Such research could apply a similar methodology as in the present study (suicide sample and comparison sample) and focus on all the characteristics in the present instrument as well as those in the Suicide Checklist and the New York Suicide Prevention Screening Guidelines. Concise modeling and the construction of a reliable and valid screening instrument may then serve as an important first step in the process of decreasing the high suicide rates in prison systems.

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